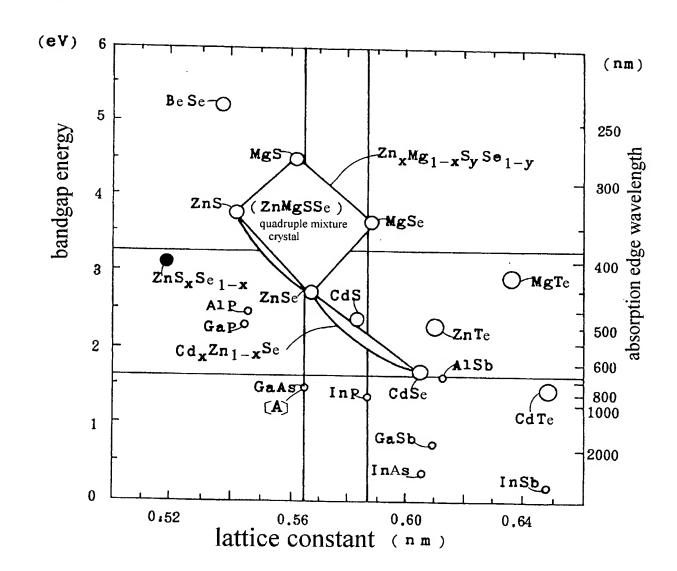
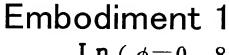
Matter No.: 14804-010001 Page 1 of 17 Applicant(s): Koshi Ando et al. ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-Y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-Y</sub> AVALANCHE PHOTODIODE

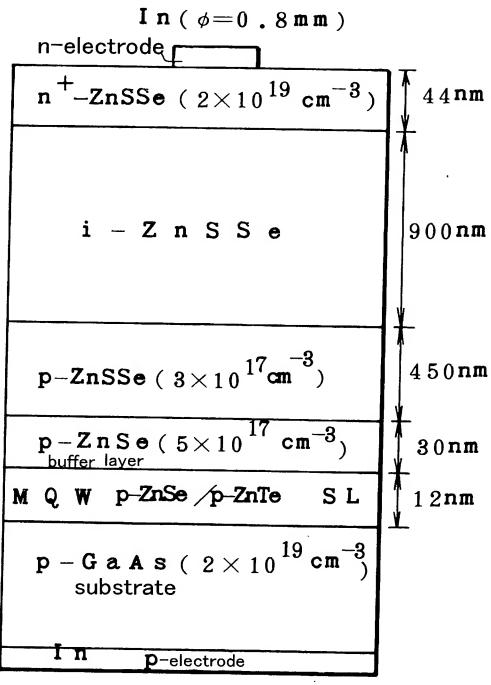
Fig. 1



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Fig. 2





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ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE PHOTODIODE

Fig. 3

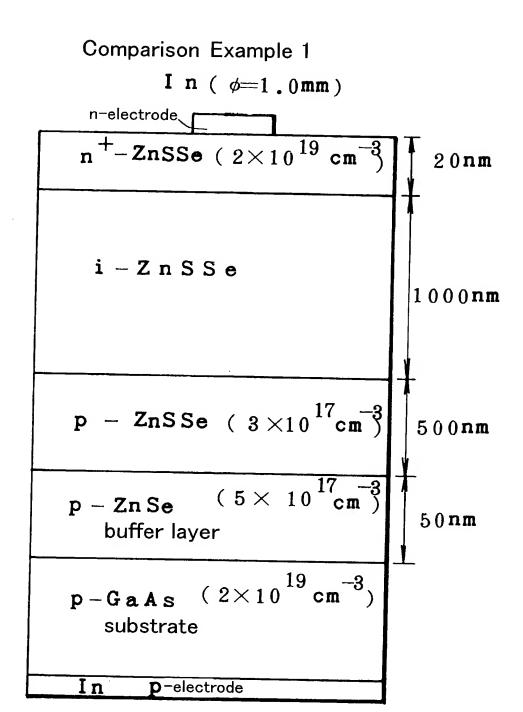


Fig. 4

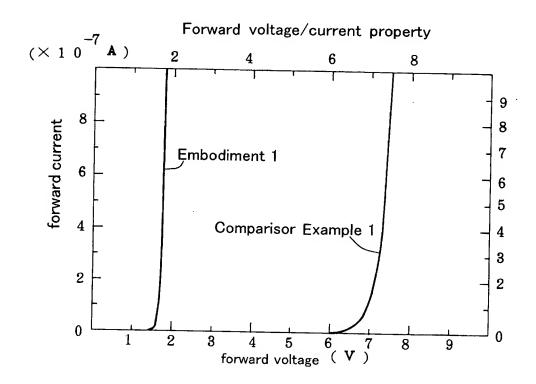
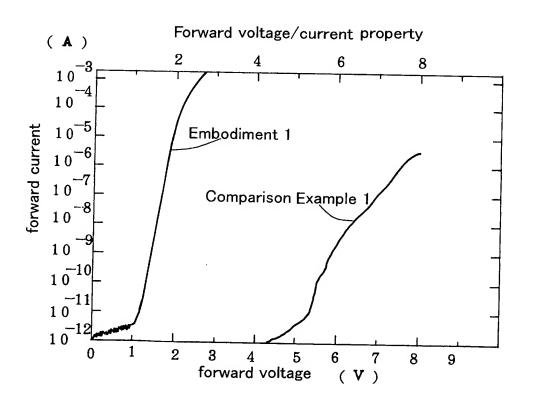
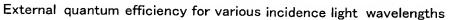


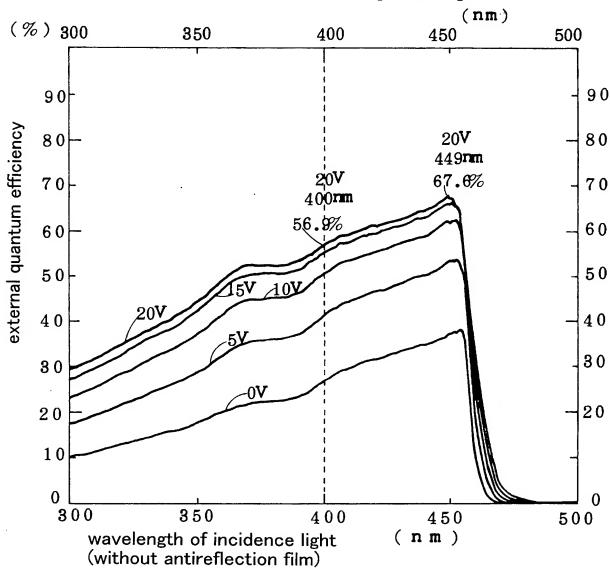
Fig. 5



Matter No.: 14804-010001 Page 5 of 17 Applicant(s): Koshi Ando et al.
ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE PHOTODIODE RATE ZN1-XMGXSYSE1-Y AVALANCHE PHOTODIODE

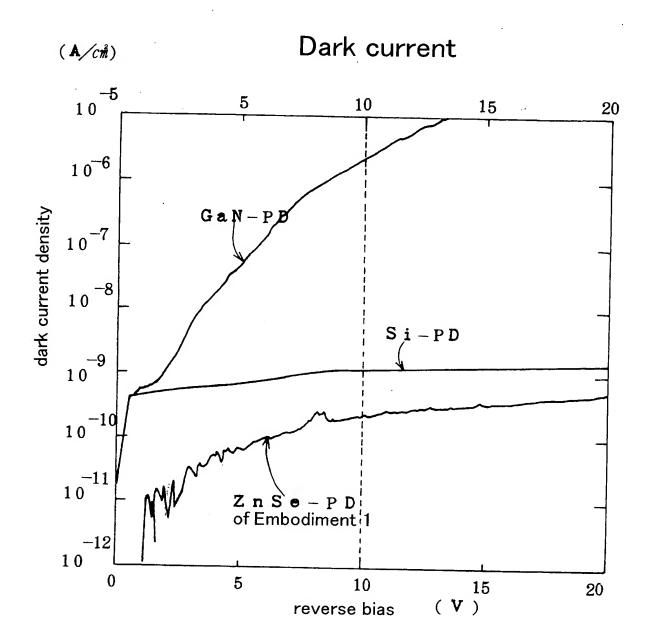
Fig. 6





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Fig. 7



Matter No.: 14804-010001 Page 7 of 17 Applicant(s): Koshi Ando et al.
ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE PHOTODIODE

## Fig. 8

## Molecular beam epitaxial growth apparatus

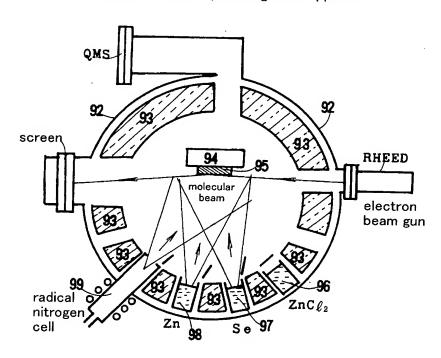


Fig. 9

( p - Z n S e )		
MQW	structure A	structure B
p-ZnTe	0.3nm	0.6nm
p-ZnSe	2.1nm	2.1nm
p-ZnTe	0.6nm	0.6nm
p-ZnSe	2.1nm	2.1nm
p-ZnTe	0.9nm	1.2nm
p-ZnSe	2.1nm	2.1nm
p-ZnTe	1.2nm	1.2nm
p-ZnSe	2.1nm	2.1nm
p-ZnT	1.5nm	1.8nm
p-ZnSe	2.1nm	2.1nm
( p -	GaAs	substrate )

Applicant(s): Koshi Ando et al.

ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE

AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE

PHOTODIODE

Fig. 10

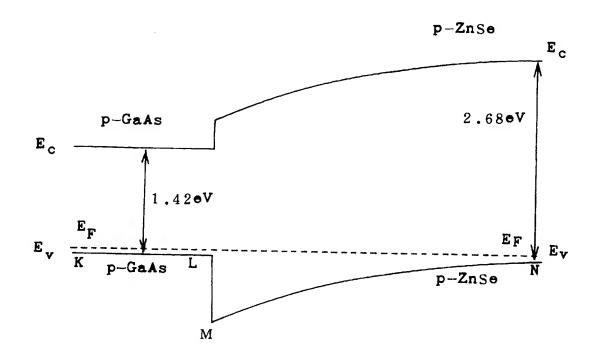
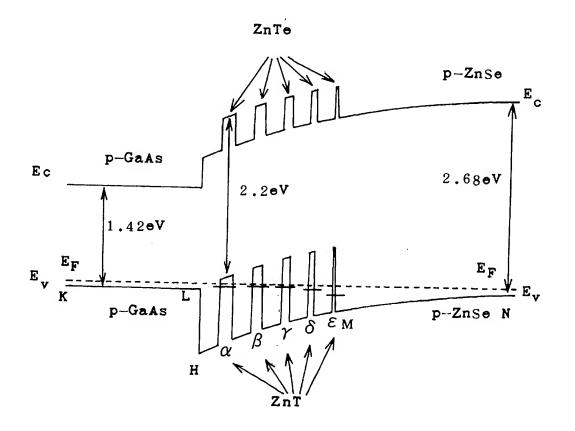


Fig. 11



Matter No.: 14804-010001 Page 9 of 17 Applicant(s): Koshi Ando et al. ON-P-GaAs SUBSTRATE Zn<sub>1-X</sub>Mg<sub>X</sub>S<sub>Y</sub>Se<sub>1-Y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-X</sub>Mg<sub>X</sub>S<sub>Y</sub>Se<sub>1-Y</sub> AVALANCHE PHOTODIODE

Fig. 12

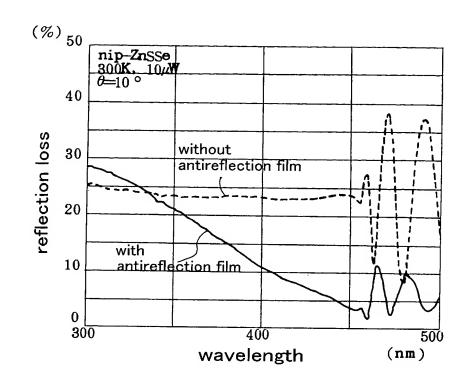
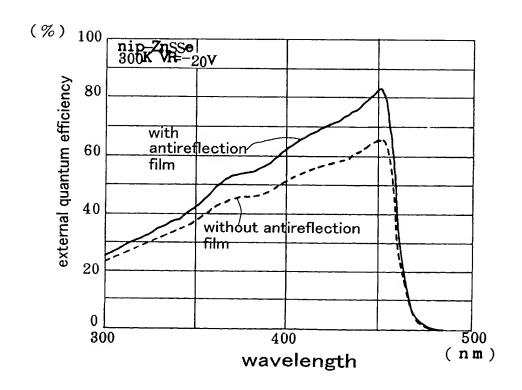


Fig. 13



Matter No.: 14804-010001 Page 10 of 17 Applicant(s): Koshi Ando et al.
ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE PHOTODIODE

Fig. 14

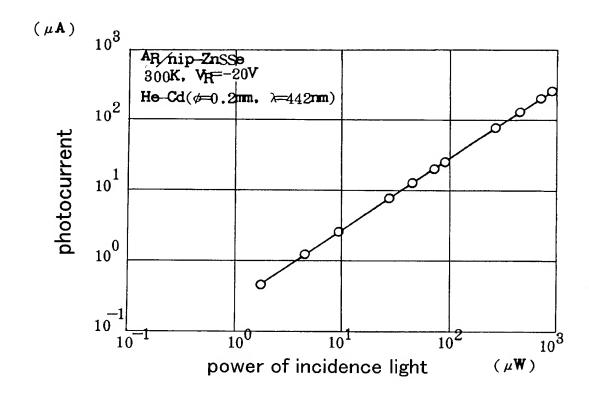
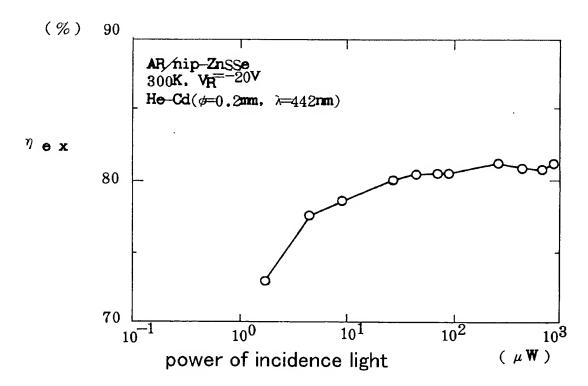


Fig. 15



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Fig. 16

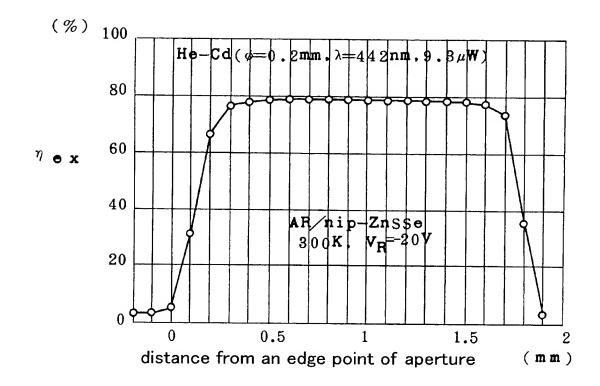
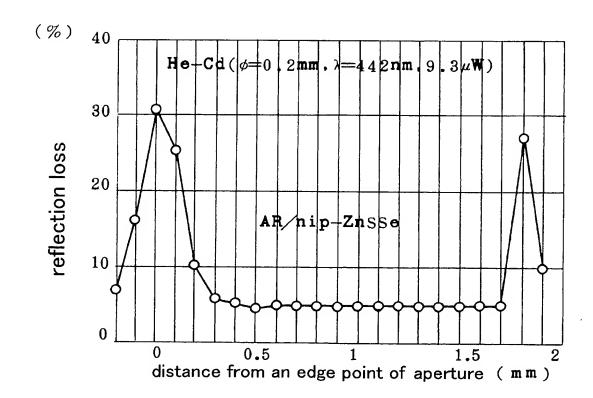


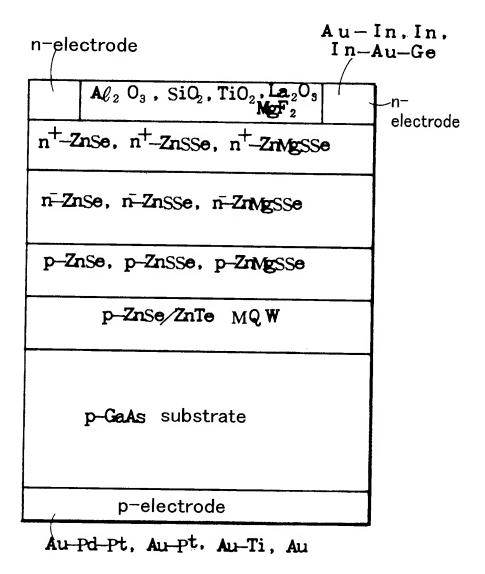
Fig. 17



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Fig. 18

## Avalanche photodiode

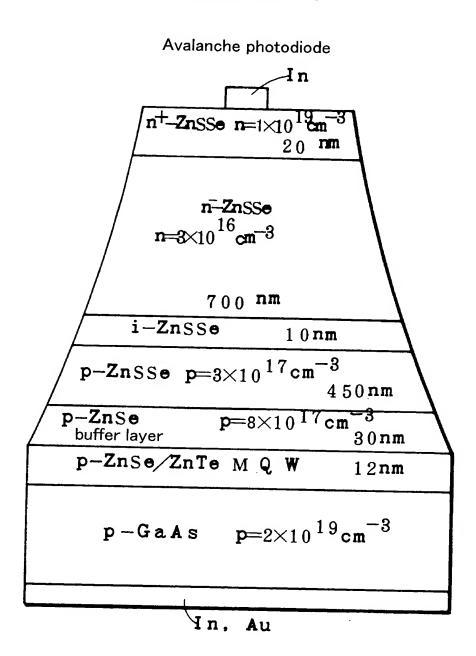


Applicant(s): Koshi Ando et al.

ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE
AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE
PHOTODIODE

Fig. 19

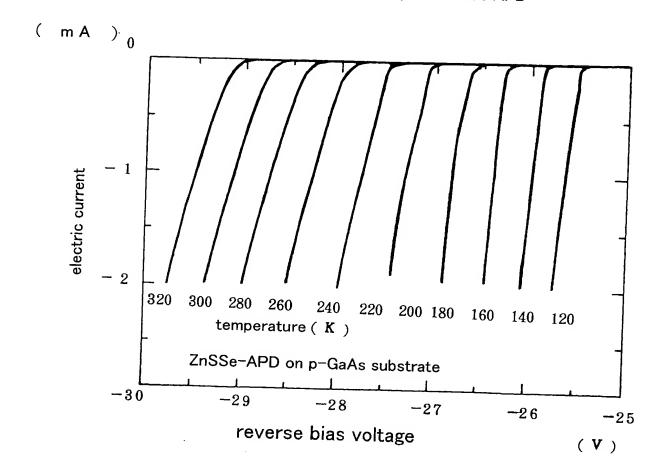
**Embodiment 3** 



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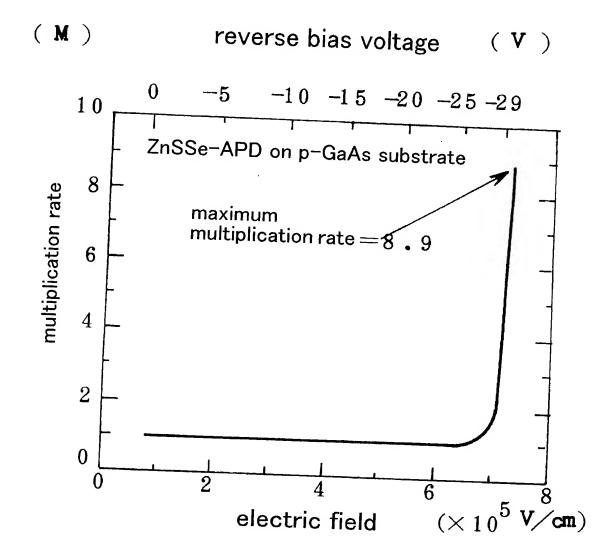
Fig. 20

Avalanche breakdown property of pin+-ZnSSe APD



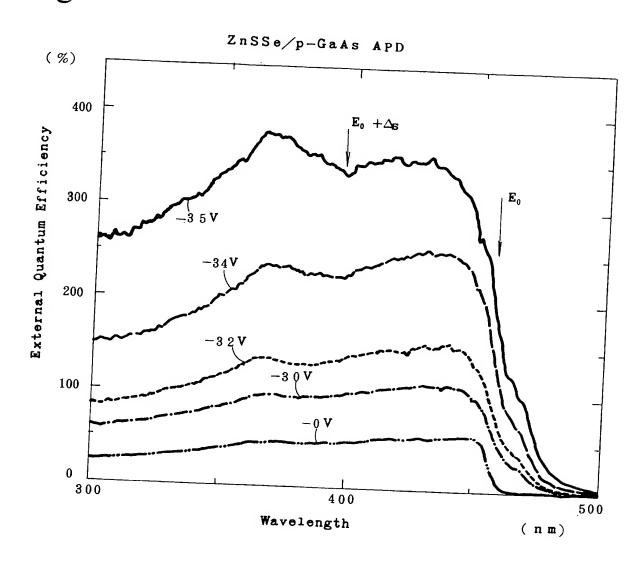
Matter No.: 14804-010001 Page 15 of 17
Applicant(s): Koshi Ando et al.
ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE
AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE
PHOTODIODE

Fig. 21



Matter No.: 14804-010001 Page 16 of 17 Applicant(s): Koshi Ando et al.
ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> PIN PHOTODIODE AND ON-P-GaAs SUBSTRATE Zn<sub>1-x</sub>Mg<sub>x</sub>S<sub>y</sub>Se<sub>1-y</sub> AVALANCHE PHOTODIODE

Fig. 22



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## Fig. 23

M Q W of Embodiment 2

( p - Z n S e )

p-ZnTe	0.2nm	
p-ZnSe	2.0nm	
p-ZnTe	0.4nm	
p-ZnSe	2.0nm	
p-ZnTe	0.6nm	
p-ZnSe	2.0nm	
p-ZnTe	0.8nm	
p-ZnSe	2.0nm	
p-ZnTe	1.0nm	
p-ZnSe	2.0nm	
(p-GaAs substrate)		

ostrate )